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East Europe Report

SCIENTIFIC AFFAIRS

No. 690

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EAST EUROPE REPORT

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CONTENTS

BLOC STUDIES OF SOLAR ACTIVITY REPORTED AT POTSDAM CONFERENCE

East Berlin BERLINER ZEITUNG in German 15-16 Nov 80 p 13

[Article by Dr Hanns Rainer Lehmann: "When Does Our Sun Produce Great Activity?--Potsdam--An International Center for Planetary Geophysics"]

[Text] In a "year of maximum solar activity" the Tenth Consultative Conference on Solar Physics took place last month in Potsdam. Approximately 100 scientists from six socialist countries discussed the investigation and scientific prediction of solar activity. The central institute for solar-terrestrial physics, i.e., the Heinrich Hertz Institute, was host on behalf of the National Committee for Geodesy and Geophysics of the GDR Academy of Sciences.

Two observatories of this institute in the GDR are investigating those parts of the sun's rays which can penetrate the protective layer of the earth's atmosphere and reach the earth's surface. These are the Observatory for Solar Radioastronomy near Tremsdorf, south of Potsdam, and the Einstein Tower Solar Observatory for visible solar rays. Other divisions of the institute investigate the effects of the sun's rays on the outer magnetic field and the earth's upper atmosphere.

For a long time Potsdam has been an internationally known center for solar research: the first systematic solar observations were already being carried on there more than a hundred years ago. At that time the construction of the astrophysical observatory on Telegraph Mountain was not yet accomplished. Through construction of the Einstein Tower 60 years ago and of the radio-observatory 25 years ago, the Potsdam solar physicists acquired powerful observation equipment which led to interesting discoveries and internationally esteemed research findings.

Consultative conferences on solar physics have been taking place for more than 15 years in the participating socialist countries. The conferences have produced a steadily growing number of agreements between the institutes of various countries to work out joint research projects.

Effects on Radio and Air Traffic

The most important theme of the most recent conference in Potsdam was a scientifically based forecast of solar activity. This forecast is important not only for basic research, but also currently for practical applications.

Strong fluctuations of solar radiation, which occur in particular during great solar flares, can destroy radio traffic and thus endanger air traffic. Secondly, it is possible that cosmonauts may be exposed to life threatening radiation while working in outer space. There is, moreover, proof of the effects of solar activity on weather, climate and biological processes.

The presentations at the Potsdam conference showed that even today, as in meteorology, statistical methods were being worked out which make possible a prediction of "solar weather." In that way the results of many years' observations of the sun are used for the derivation of empirical rules.

A Whole Chain of Measuring Instruments Set Up

But reliable forecasts will only be possible if we better understand the physical processes in the active areas on the sun. These areas involve limited regions on the sun's surface which exhibit especially strong magnetic fields. But the complicated interaction of these magnetic fields with hot, electrically conducting solar gas is the cause for the manifold occurrences of solar activity.

The investigation of the underlying physical laws is at the center of present and future cooperation. At the conference in Potsdam it was said that that refers to theoretical research projects as well as coordinated observation programs. The chain of solar magnetographs, that is, of equipment to measure solar magnetic fields, which includes the observatories from Potsdam to Vladivostok, serves as an example for these programs. This chain is directed from Potsdam. It has been working successfully for several years.

PHOTO CAPTION

A modern microwave spectrograph was installed in Tremsdorf near Potsdam in cooperation with Soviet scientists.

CSO: 2302

BRIEFS

CSSR COMPUTER EQUIPMENT FOR USSR--The Industrial Automation Plant in Prague-Kosire [originally called KRIZIK] has delivered their 50,000th FS 1501 photoelectric punch tape reader to the USSR. The reader acts as a "brain" in various computer systems, mainly in data processing, programmed machine tooling, printing and textile machinery, etc. A top quality electronic product, the reader is one of the most important components in the complex industrial robots. ZPA Kosire [Industrial Automation Plant in Kosire] will become a concern enterprise as of 1 January 1980. [Prague LIDOVA DEMOKRACIE in Czech 25 Nov 80 p 1]

CSO: 2402

NEW ACHIEVEMENTS IN PHOTOPROCESSING TECHNOLOGY

Sofia RABOTNICHESKO DELO in Bulgarian 4 Nov 80 p 4

[Article by Vasil Simeonov: "A Challenge to the Theory"]

[Text] Several decades ago in the theory of the photographic process, the prevailing hypothesis was one termed the Gurney and Mott theory. It assumed that the light attack on the photographic material, usually silver bromide, led to a photochemical reaction related to the formation of a free electron and another particle which in the language of solid state physics was termed the "hole." There is no need to go into details as the theory explained very well the behavior of phenomena in photography, even though it "rested" predominantly on the photoelectrons. The "photo-holes" or "photospecks" were passed over in silence, and almost nothing is known of them.

Precisely here appeared the first Bulgarian challenge to the theory. Prof Yordan Malinovski created an original method for the quantitative recording of the neglected "photo-holes." This made it possible to determine all the parameters characterizing the relationships of these particles in the silver halides, the basic material of classic photography. The obtained data forced a revision of the existing notions of the mechanism of the photoprocess, and led to the creation of a new theory or a new system. This is generally recognized at present, and its popularity can be seen from the fact that its basic conclusions are quoted in every work related to the theory of photography.

We come now to the second Bulgarian challenge to the system. Only this challenge was actually aimed not at any scientific hypothesis, but rather at a practice at those times in our scientific activities. Practical applications for the new theory were being sought. Because in photography 10-15 years ago, major problems began to be discussed including the depletion and greater cost of silver (the basic raw material for photographic emulsions), the need for new, special photographic materials designed for microelectronics, and so forth. Also further developed were the ideas concerning the essence of the photographic process, the nature and size of the latent image and its relationship to the development processes. The Central Laboratory for Photographic Processes under the Bulgarian Academy of Sciences was founded as an independent scientific unit.

The scientific contributions by the coworkers from the laboratory would take entire pages to list, but to everyone it is still known as a research unit which has given serious attention to the practical aspects of scientific achievements. The

light-sensitive systems developed in the laboratory on the basis of vacuum-vaporized thin layers of silver and silver-free compounds have disclosed new technological possibilities for producing photographic materials with exceptionally high qualities. Therefore, the obtained results from the scientific research, in starting from the first challenge to the existing hypothesis, have been directly related to technology, to the high demands of modern microphotography, photorecording equipment and the needs of electronics. This can also be seen from the realized and patented methods for obtaining a directly positive photographic material on the basis of silver-arseno sulfide, for obtaining photographic materials based on silver-free light-sensitive compounds, and for synthesizing several pure silver halides.

Precisely this useful and direct link between scientific research and the opportunities for its practical realization provided an opportunity to move on to the next stage, the introduction of the new production methods of special photographic materials, as well as their semi-industrial application in the laboratory itself. And if we must give several specific examples in this regard, we might merely leaf through the jubilee collection of the laboratory published on the occasion of its 10th anniversary. Here are the development of the flexible printed cards for the permanent memory of the EIM-1022; the flexible connecting cables in the electronic calculators produced by the Office Equipment Plant in Silistra. The laboratory has developed and put into regular operation lines which carry out the vacuum-vaporizing of the new photographic material. The silver halide layers which possess a number of technological and functional advantages for the needs of microelectronics also are gaining technological realization at the laboratory. To these activities we must also add the development of equipment for producing chromed plates (only for microelectronic purposes!), as well as the developed method of synthesizing certain super-pure substances.

Few academy institutes can be praised for such a broad "technological program." Precisely here is to be found the force of that second challenge to the standard theory. But does not this aspect of the daily activities alter the balance between science and technology in favor of the latter? The proof of an optimum balance this time will not be found by compulsory quantitative criteria such as the number of scientific publications, citations in texts, defended doctoral or candidate dissertations, or participation in congresses and sympsiums. The laboratory has enough of these "assets." We will not "count" the awards, diplomas, certificates or gold prizes as there is a sufficient number of them. But when the recognition, spontaneous and unforced, comes from "scientific competition," then proof of the necessary equilibrium is at hand. Seven years ago, the first international symposium was organized on model research on the photographic process. Recently the second symposium on the same subject completed its work. Foreign guests had an opportunity not only to read their papers and listen to statements by coworkers from the Central Laboratory for Photographic Processes. They visited it, and became acquainted with its unique facilities and equipment. For them the praising comments were no pro forma statement, and many already will link Sofia and Bulgaria with vacuum-vaporized thin layers.

In the area of photographic science, Bulgaria is a leading country. And one of the reasons for this is the bold challenge to the convenient cover of routine.

10272
CSO: 2202

CZECHOSLOVAKIA

PROSPECTS FOR USE OF LASERS IN CSSR MEDICINE DESCRIBED

Prague JEMNA MECHANIKA A OPTIKA in Czech No 9, Sep 80 pp 235-238

[Article by Eng Dr Antonin Novak, Candidate of Sciences, Natural Sciences Faculty, Palacky University, Olomouc: "Current Status and Prospects of the Use of Lasers in the Biomedical Fields of the Czechoslovak Health Sector"]

[Text] 1. Introduction

A series of important discoveries in quantum electronics, which have led to the development of the quantum optical generator--the laser--date from the beginning of the second half of the 20th century. Thus far the laser has been able to expand virtually all the areas of human activity in which it has been studied and applied, and we may say that its further utilization is proceeding steadily. This is also the case in the medical disciplines. While 10 years ago only the applications of lasers in eye surgery were well known, today there is a considerable number of applications in a wide range of biomedical fields, and not only in experimental work, but in clinical practice as well. At the same time it should be borne in mind that unified instrument systems with full control and regulation of laser radiant energy are just beginning to be developed in the medical field, while in other areas of science and technology lasers are already an indispensable tool for improving both the production process and the characteristics of the final product.

In view of the fact that the laser in all its modifications offers great promise for further development and improvement of all the medical disciplines, and also because noteworthy results have already been obtained abroad not only in experimental work but especially in clinical practice, the First National Seminar on the Use of Lasers in Medicine was organized. This seminar, which is the only one of its type thus far in Czechoslovakia, was held on 2-3 April 1980 with the effective cooperation of the Tesda Valasske Mezirici national enterprise. The seminar received a great response from more than 150 plysicians from various health organizations throughout Czechoslovakia. In addition to hearing specialized lectures and communications from technical workers who have already begun work with laboratory animals using lasers, the conference participants also saw a demonstration of the first Czechoslovak laser scalpel, which uses a CO_2 laser and which because of its ease of operation and its unique articulated arm, with a set of cutting instruments, can bear the most rigorous comparison with foreign products. Czechoslovak components bases were used exclusively in its production, and its introduction into production currently depends on approval by the relevant offices in both ministries of health (Czech and Slovak).

Since the results achieved with the first Czechoslovak laser scalpel in experimental animals have been so conclusive, the delegates called upon the organizing board of the seminar to make a request on their behalf to the highest representatives of the two ministries of health and the representatives of party and state organs that they grant an exception and allow the beginning of clinical practice with the first Czechoslovak laser scalpel in the No 1 Surgical Clinic of the Faculty Hospital in Olomouc, where a group of doctors led by Docent Miroslav Tomsi, MD, Candidate of Sciences, has already conducted and analyzed a number of experiments on experimental animals using the first Czechoslovak laser scalpel. These doctors are prepared to begin clinical practice and to train additional physicians from other organizations in Czechoslovakia. It would truly be a great national economic and moral loss if the lengthy discussions on introduction of the first Czechoslovak laser scalpel into clinical practice resulted in the halting of further work on this device, which would certainly produce a negative effect on the enthusiasm and work initiative of the research group in the Department of Precision Mechanics, Optics and Optoelectronics of the Natural Sciences Faculty, UP [Palacky University] in Olomouc, which developed the laser scalpel and has applied for a Czechoslovak patent.

To allow consideration of the problems discussed and the scope of the seminar, a collection of contributions has been prepared. This gives the best possible overview of the broad scope of the use of lasers in medicine, of the current level of work with lasers by certain organizations in Czechoslovakia and of the further prospects and possibilities for using Czechoslovak lasers in clinical practice.

2. Previous Biological and Medical Applications of Lasers Abroad

Currently the basic question worldwide is not where it might be possible to use lasers, whether in surgery, dermatology, gynecology, eye surgery, stomatology, urology or in biological laboratories, but what advantages the more complex applications of laser radiation have over standard, classical and sometimes obsolete methods. The following capabilities should be considered as demonstrable advantages of the laser over the ordinary scalpel, thermal and electrical cautery, the ultrasonic generator and cryotechnique:

1. The laser makes possible noncontact, sharply delimited cutting of tissues with various photooptical properties. If thermocoagulation occurs, as in the case of the CO_2 laser in the infrared region, this only affects a narrow margin of cells, depending directly on the density of the incident energy and the focusing of the beam over time (Richfield, Goldman, Gamaleija and others).

2. The microthrombotizing effect stops bleeding from vessels within a diameter of 1 millimeter, with a poorer effect in arteries than in veins. The technique of micropatching with thrombin that has been developed gives excellent results, however, even in incisions of parenchymatic organs. Here the results in "bloodless" operations are far better than with standard methods, particularly in liver resection and the like.

3. With modern lasers it is possible to regulate simply and reproducibly the depth of penetration of the laser ray into the tissue, in direct proportion to the intensity of the laser radiation and the exposure. It has been possible to design

for shifting of the focus of the incident laser beam, as well as to introduce various micromanipulation systems such as operating microscopes with a guiding ray from an He-Ne laser and with a cutting beam from a CO_2 laser, and the like.

4. Healing of incisions compares very well with normal collagen restitution after incision with a knife, and is significantly better than for the carbonizing electrocoagulator or cryocautery (Kaplan, Schoenberg, Aronoff, Beck and others).

The most recent references in the foreign technical literature (Aronoff, Goldman, Kaplan, Karpenko, Ascher and others) stress the advantages of CO_2 laser as a cutting instrument--a scalpel, while the Neodymium-YAG laser appears to be best for coagulation, the pulsed ruby laser or argon laser for dermatology and so on. A certain leading foreign clinical organization has several types of such laser devices which it uses, for example, in various combinations or in alternation, depending on the nature of the experimental or clinical application.

Also of importance is the development of basic biological research on laser interaction with living tissue, even at the subcellular level. Microoperations on dividing cells in tissue cultures with disruption of individual chromosomes and effects on the genetic code are currently being studied by certain important foreign laser laboratories (Bessis, Rounds and others). Currently the permeability and reflectivity of various tissue components as functions of different variables are being studied by many laser laboratories in foreign universities, as are temperature (with various levels of blood flow in supplying arteries), pigments with large selective radiation absorption, the rate of tissue metabolism, ionic equilibrium in body fluids and the like.

Applications of high power lasers in cancer surgery have received differing evaluations. But operations on various malignant tumors of the digestive tract have already produced certain results, particularly use of the CO_2 laser for the removal of various soft components with tumor infiltration, as reported by a number of important surgeons (Kaplan, Galaleija, Aronoff, Beck and others).

In neurosurgery (Ascher, Steller and others) the results of operations on various tumors have been quite unambiguously improved by the simultaneous excision and evaporation of the altered tissue by means of lasers, with effective exhaustion carried out by means of an ultrasonic exhauster. Certain hemangiomas cannot be removed without excessive bleeding except by the use of the continuous wave laser.

This brief survey of world developments does not end with the area of dynamic capabilities of lasers, such as in X-ray radiation, molecular holography, laser spectroscopic microanalysis, the use of evacuated lasers in the ultraviolet region for separation of the DNA helix and so on. Its use in operational areas currently runs up against general ignorance of progress in these procedures, high purchase prices and the technological complexity of current sophisticated lasers. On the basis of the results obtained with Czechoslovak lasers, it is a realistic suggestion that in our health field too they might make possible more extensive application of lasers in clinical practice in all areas, with a severely critical attitude, but without an unhealthy conservatism.

3. Experimental Results Obtained with the Czechoslovak CO_2 Laser Scalpel

Of all types of laser radiation, that from the CO_2 laser has the most favorable properties for use in surgery, since it operates at a wavelength of 10.6 microns in the

far infrared region. This makes possible rapid absorption of the laser radiation when it strikes living tissue; in practice, when it passes through tissue 150 microns thick, a beam from the CO_2 laser loses 95 percent of its energy.

During 1979 we verified certain published results of foreign laser laboratories with experimental animals (pigs and dogs) using the first Czechoslovak laser scalpel with its CO_2 laser. We carried out incisions of the skin, the subcutaneous layer and the muscular parts of the abdomen, and resection of the liver, the spleen, kidney stomach, and large and small intestines, as well as resection of lung parenchyma, of the arterial system and of cartilage. We can state on the basis of the overall results that the area of carbonization after incision is minimal, healing of wounds is excellent, and all laparotomies and thoracic incisions healed per primam [directly, without the intervention of granulations], regardless of whether the primary suturing is done only in one layer or layer by layer. Postoperative treatment of experimental animals was carried out in the veterinary hospital in Olomouc. Intestinal resections were carried out on the experimental animals without advance preparation of the intestinal tract. The resectioned segment measured 10 cm, and anastomosis was carried out in all cases with atraumatic suturing and in one layer. All anastomoses were found to heal completely. Identification of the location of the operation was made by nonabsorable marker sutures. The passage through the anastomosis was complete, and no cases of exitus in the experimental animals as a result of dehiscence of the anastomosis were found.

We also examined resected livers or their resected surfaces, after preliminary resection and subsequent coagulation by a nonfocusing beam. The cut surfaces were completely healed, without subsequent or immediate hemorrhage.

In order to check the CO_2 laser in gynecology, and particularly to determine the effect of radiation from the CO_2 laser on uterine tissue, we did joint experimental work with the Obstetrical and Gynecological Clinic of FN [Faculty Hospital in Olomouc on uteri obtained during abdominal hysterectomy. This involved myomatotic uteri with slight changes in the cervix which had not previously been treated by another method. All of the preparations were subjected to histological investigation after irradiation with the CO_2 laser, and the results completely confirmed the important qualities of CO_2 laser radiation, and the ease of operation and high quality design of the Czechoslovak laser scalpel, which makes it possible to change the end manipulator during a surgical procedure. A special tip manipulator of the laser scalpel assures safe treatment of cervical defects, thus assuring patient safety.

In this connection we should note that the group of workers led by Z. Naprstek, M. D., Candidate of Science, at IKEM in Prague, had tested laser radiation in experimental surgery during the 1970's, but at that stage the conditions did not yet exist for the development of the initial Czechoslovak laser scalpel.

Based on experimental applications of the Czechoslovak CO_2 laser scalpel already carried out, it has been stated that the CO_2 laser is suitable for selected surgical procedures and that it complements the classical scalpel, over which it has a number of advantages:

1. The incisions are sharply limited;

2. Compared with electrocautery, coagulation necrosis affects only a narrow band of cells, while no other destructive or ionization effects appear in the surrounding tissues;

3. The cutting instrument does not touch the site of the operation, which results in high sterility of the incision;

4. The incision does not hemorrhage, because hemorrhaging ceases in the capillaries at the time of the first pulse (the so-called "microthrombotizing effect");

5. Rather severe hemorrhage can generally be stopped by means of a defocused beam;

6. The depth at which the laser radiation acts can be controlled, for example by choosing the speed of incision, by changing the laser power, by shifting the focus and the like;

7. Healing of incisions is excellent, with high resistance to common infections and with minimum occurrence of keloid scars;

8. It is possible to perform microoperations which were impossible with classical instruments, which is particularly important in neurosurgery, otorhinolaryngology and the like.

4. The Articulated Arm of the Czechoslovak CO_2 Laser Scalpel

In order for the laser which produces the initial beam to be usable as a surgical instrument, it is necessary to use a transmission device which makes it possible to transmit the laser beam to any location in the operating area. Fiber optics can be used for radiation in the visible region, but for the CO_2 laser, which radiates in the infrared, no suitable fiber optics exists, and accordingly it is necessary to use a mirror optics system organized in the so-called "articulated arm" to guide the beam. This arm, whose output end is held in the surgeon's hand, along with the laser and the focusing system, constitute the laser scalpel. The articulated arm consists of tubes of suitable length which are connected by rotating joints containing reflective mirrors, making it possible to turn them relative to each other around the optical axis. For ease of manipulation of the scalpel, the entire system is balanced. The articulated arm ends in a replaceable extension which the operator holds in his hand during the surgical procedure; its diameter, length and design depend on the optical system, the nature of the surgical procedure, and patient and operator safety. In use with experimental animals, the extension used had a maximum diameter of 20 mm. and its output section was provided with a "guiding contact," at the tip of which was the maximum narrowing (the focus) of the beam, as required for a sharply limited incision. To remove the waste products produced during the cutting of tissue, either the interior of the articulated arm or a tube of synthetic material is used as a passage for compressed air or nitrogen from a small portable cylinder.

In work with any laser it is necessary to protect the vision with suitable protective eyeglasses containing special glass. Thus far there is no universal type of

glass which can protect the vision from all wavelengths without reducing visibility. It is an advantage of the CO_2 laser that ordinary glasses containing plexiglass or diopter glass can be used to protect the vision from its radiation.

5. The Laser Base in Czechoslovakia and Possibilities for Production of the Czechoslovak CO_2 Laser Scalpel

Currently the main producers of lasers in Czechoslovakia are:

1. The Research Institute of Vacuum Electronics in Prague (TESLA VUVET), which produces a large number of He-Ne lasers for the construction industry, for mines and for other production and research organizations. The VUVET production program also includes the production of a CO_2 laser with the production designation of TKG-241, which will have a radiative power of about 60 watts, but the length of the laser tube (2,300 mm) somewhat complicates placement of the laser in the operating room. Intensive development of short CO_2 laser tubes (1,000 mm) is currently under way, which will make it possible, for example, to place the laser in a vertical position in combination with the power supply.

In addition to gas lasers, VUVET Prague's production program also includes solid-state lasers, particularly a ruby laser in various production modifications and with various output powers. A neodymium YAG laser has also been prepared for production, and will expand the possible applications of lasers in other biomedical fields.

2. The Institute of Instrumental Engineering of the Czechoslovak Academy of Sciences (UPT CSAV) in Brno has produced a number of He-Ne lasers with radiation outputs of 6, 40 and 85 mW, operating in the fundamental transverse mode (TEM_{00}). Production of these lasers has been assigned to the Metra Blansko national enterprise under the type designations LA 1003, LA 1002 and LA 1001. These types of lasers may find application in dermatology, oncology, laser acupuncture and the like.

3. During the Seventh Five-Year Plan, the Meopta Prerov national enterprise will also be producing certain types and series of gas and solid state lasers with various radiative powers. We may assume that Meopta Prerov will also be producing the separate optical parts needed for the use of lasers in holographic interferometry and the like.

We obviously may conclude from this brief summary of the laser production base in Czechoslovakia that we can count on a developing components base in Czechoslavakia for further modifications of the Czechoslovak CO_2 laser scalpel and for the manufacture of other laser instruments for experimental and clinical use. Small-series production of the Czechoslovak CO_2 laser scalpel can be begun practically instantaneously at the Development Laboratories and Shops of Palacky Univeristy, whose organizational structure and facilities guarantee high quality products.

6. Conclusion

As became clear during the National Seminar on the Use of Lasers in Medicine, and of course through the rich discussion during the seminar, there is great interest in the use of the extraordinary properties of laser radiation in the biomedical fields. It was also universally stated that we cannot content ourselves with the

current status of the surgical instrument base, which is not in line with current world trends as far as lasers are concerned. As shown by results from foreign organizations, where the laser scalpel has already found a solid and justified place in clinical practice, a surgical procedure can be carried out with short pulses of laser radiation without anesthesia and even in outpatient conditions, a fact which is of great national economic importance. At the same time, the entire operative procedure can be carried out practically without hemorrhage, because the laser scalpel makes possible coagulation in the blood vessels.

Laser equipment produced by certain foreign companies for clinical practice is extremely expensive, and in some cases an embargo has been declared on it (laser scalpels using CO_2 lasers). Moreover, to give an idea of the high purchase price of a laser scalpel abroad, we note that currently it costs about 150,000 West German marks, or $50,000 to $80,000. In comparison, the purchase price of the Czechoslovak CO_2 laser scalpel, produced exclusively with domestically-produced components, is about Kcs 150,000. When a larger number of such laser scalpels is being produced, we may expect a considerable drop in their purchase price. This will make it possible to provide this efficacious laser radiation not only to the medical faculty and kraj hospitals, but also to other selected health organizations.

As indicated by the proceedings of the First National Seminar on the Use of Lasers in Medicine, and by work done with experimental animals using the Czechoslovak CO_2 laser scalpel, this laser is ready to begin clinical practice. It would be possible to set up a training unit at the First Surgical Clinic of the Faculty Hospital in Olomouc, with the possibility of further close cooperation with scientific and technical workers in the Department of Precision Mechanics, Optics and Optoelectronics of the Natural Sciences Faculty of Palacky University, where the first Czechoslovak CO_2 laser scalpel was developed and fabricated. This organization has had long-standing, rich experience in the development of various optical, optomechanical and optoelectronic instruments and equipment. Other than the Laboratory of Optics, it is the only organization of this type in Czechoslovakia, and in it is assembled the greatest scientific, scientific-technical and technical contingent in the area of precision mechanics and optics. The complete production documentation for the Czechoslovak CO_2 laser scalpel is ready for production. The facilities and of Palacky University's Development Laboratories and Shops guarantee that it will be possible to manufacture additional CO_2 laser scalpels in a very short time, and to furnish them gradually to other selected organizations in Czechoslovakia.

The surgical base of IKEM in Prague, which also has rich experience with experimental use of lasers, and in part with their clinical use, could be another training center. This organization has already been maintaining close cooperation with the Department of Precision Mechanics and Optoelectronics of the Natural Sciences Faculty at Palacky University.

The participants in the national seminar on the use of lasers in medicine received with particularly great satisfaction the announcement of the organizers that starting in the 1976-77 school year the Department of Precision Mechanics, Optics and Optoelectronics of the Natural Sciences Faculty of Palacky University had instituted a separate program in optoelectronics oriented toward applications in the biomedical fields. Under the name of "Optoelectronics in Medicine," this program is elected by 5 to 8 students a year, who begin their own specialization starting in the third year of study. The program is 5 years long and is coupled with a thorough 2-year

grounding in mathematics and physics. This preparation of personnel is in accord with the world trend, in which currently the clinical organizations equipped with the most modern equipment, employ not only doctors but also specialists graduated from physics programs who have a basic knowledge of theoretical medical disciplines and profound knowledge of experimental and theoretical physics, optics, electronics, and the design of precision mechanical and medical instruments. This prevents the great national economic losses which would result from inadequate servicing and maintenance of the demanding optical, optomechanical and optoelectronic instruments and equipment.

It is up to the responsible officials in the two ministries of health, Czech and Slovak, to take the necessary steps so that new specialists can be introduced into the work plans of the individual health organizations, and so that alongside the development and expansion of laser engineering and its use in clinical practice, a process of producing workers with a higher education who are capable not only of mastering the highly demanding laser instruments and equipment, but also of repairing them, improving them and developing possibilities for their further utilization is implemented.

The conclusions which were adopted by the participants in the First National Seminar on the Use of Lasers in Medicine in Valasske Mezirici are an objective evaluation of the situation in our health sector. They give a sober evaluation of the current status of foreign experimental and clinical organizations as regards the introduction of lasers into medical practice and indicate the real conditions according to which we can follow worldwide developments in the application of lasers in clinical practice. Now we again remind the two ministers of health of the possibility of immediately beginning clinical practice with the first Czechoslovak CO_2 laser scalpel, and also the possibility of producing additional modifications of it at Palacky University, possibly in cooperation with active utilization of the production capacities of the Meopta Prerov national enterprise.

We can only wish that all the positive preconditions and results of previous experimental stages of application of lasers in the biomedical field will find full and timely utilization in practice. We want this process to be aided by fulfillment of the decrees of the state and party organizations regarding improvement of the services of our socialist health care industry, so as to enable us to take a leading place worldwide.

8480
CSO: 2402

BRIEFS

COBALT FROM WASTE--VCHZ [East Bohemian Chemical Plant] in Pardubice began processing resins in 1979. Resins used to be burnt in the past, but now are used as a raw material for production of cobalt, which Czechoslovakia has been importing for hard currencies. According to estimates world cobalt reserves will be exhausted in 40 years. [Prague SVOBODNE SLOVO in Czech 20 Nov 80 p 5]

NEW COMPUTER CENTER--A new computer center became operational at concern establishment SPOLANA in Neratovice. The center, with its Polish-made EC-1032 computer, will facilitate tasks in the areas of work problems, production, maintenance and wages. [Prague RUDE PRAVO in Czech 25 Nov 80 p 2]

CSO: 2402

GERMAN DEMOCRATIC REPUBLIC

ACHIEVEMENTS, POSSIBILITIES OF GENETIC ENGINEERING PRESENTED

East Berlin HORIZONT in German Vol 13 No 28, 1980 signed to press 15 Sep 80 pp 22-23

[Article by Prof Dr D.G.R. Findeisen: "Genetic Engineering: Prospects, Misuse, Possibilities of Genetic Technology"]

[Text] Genetics and genetic research have made broad advances internationally during the past decade, especially through the introduction of new techniques. Modern gene technology is based on one of the greatest recent discoveries in biology--the understanding that an acid (desoxyribonucleic acid or DNA) in cell nuclei contains the genetic material--and also on the discovery of the so-called genetic code. The consequences derived from these discoveries, especially the possibilities of direct manipulation of the genetic mechanism of organisms, including man, by means of genetic engineering, were discussed by experts, among others, in our country in 1979 at the Seventh Colloquium in Kuehlingsborn, on philosophical and ethical problems of modern biological sciences.

Some aspects of this problem should be pursued here, especially the basic features of gene technology and its range of application, the dangers associated with it, and also the possibilities of using this knowledge to benefit mankind.

Basic Features, Function of the Genetic Material

It is known that DNA contains the genetic information of every cell capable of division. The genetic material consists of one or more nucleic acid molecules. Such a molecule can be pictured as a long thread containing "printed music." But instead of the seven basic tones of the octave, there are only four here. These "tones" are assembled on the nucleic acid like the tone sequences of printed music. One can thus compare the genetic setup, or rather the gene, with a melody. And all the melodies of a cell furnish the genetic information, or rather the genome, of this cell. Today it is already possible to introduce genetic information into isolated animal cells to transplant it.

We know, at least since Charles Darwin (1809-1882), that, as long as life exists, there are also interferences with the genetic substance without assistance by man. They occur randomly and bring about changes in the genetic setup leading mostly to genetic defects, and will disappear again with the death of the affected individual. On the other hand, the relatively few useful structural changes

(mutations) in a gene will give a living creature better chances for survival than its fellow creatures. Darwin rendered the service of being the first to call attention to these--very prolonged--positive changes in the genetic material through natural selection, in his famous book: "The Descent of Man and the Origin of Species." And it was Friedrich Engels who led Karl Marx to these significant findings of Darwin.

Man learned very early to put to his advantage the methods of selection and not to leave it to the environment alone. While he used it purposefully, grain strains with high yield, domestic animal strains with high meat content, race animals and stud horses, and many others were developed. Until now, the manipulation of genetic material was limited, because desired genetic traits could be achieved only by crossing within a single biological species, for instance, by bringing together suitable breeding animals of a particular race. These limits to a single community of species were overcome by genetic engineering. Thus, for instance, by the artificial infection of human cells with a certain virus--for the time being in the laboratory--a life threatening genetic defect can be removed which was not reachable before by any other means.

Misuse, Dangers of Gene Technology

Of course, closely related to these possibilities of influencing the genetic material is the concern whether the work of the so-called genetic engineers could not also present dangers to man. Private citizen-scientists are drawing comparisons with atomic power or with the poisoned gas warfare by U.S. imperialists in Southeast Asia. Wherever it was used, the very dangerous dioxin led not only to defoliation of trees with serious consequences such as aridity and floods, but also to chromosomal changes in numerous individuals, abortions, miscarriages and defective births as well as cancer.

Such concern is understandable in a social system which cannot guarantee at all that the knowledge derived from science and technology will only be used for humanitarian purposes. Therefore, 5 years ago, a conference was set up for leading geneticists from 17 countries, the Soviet Union among them, in Asilomar (United States) and a moratorium was agreed upon which forbade certain experiments until open problems are completely resolved, in addition to urging the elaboration of safety guidelines.

Even if, luckily, some of the fears proved baseless in the meantime, according to the current view, the closer the gene donor is to the human species, the greater the possible risk estimates should be. Accordingly, genetic material from mammals carries considerably greater danger than those from plants, unicellular organisms and bacteria. In the GDR, recommendations were made according to which a commission directly responsible to the secretary of health should determine the safety measures to be provided. Meanwhile, analogous guidelines are also in effect in other countries.

In the Western world--especially since a 1962 symposium in London on the theme: "Mankind and Its Future"--tempers are being aroused by the fantasies of certain science fiction authors. Exponents of the media--oriented less toward information

and more toward manipulation, creation of fear and distraction from social contradictions--are engaged in the most contradictory speculations. The future visions of some Nobel prize winners, presented in unconstrained form at the above-mentioned symposium, are in part put as absolutes, to conjure up a version of "genetic degeneration of mankind" for which there is no scientific basis; or else to "save the future of mankind" which, in any event, is threatened by an imperialistic atomic war. There are also sensational fabrications involved with the possibility that, by means of genetic manipulation of the human personality, the historical crisis situation of capitalism could be remedied in a biological-genetical manner. An attempt is made to suggest that, through the work of genetic engineers, not only could allegedly existing genetic decline of mankind be avoided, but antagonistic societal controversies could also be overcome.

To sum up, one could skirt around necessary social changes in this manner. But the social essence of man demands social activities first of all.

How Timely Is 'Cloning' of Man?

This question is posed here on principle, disregarding the erroneous ideological, culture-pessimistic and unscientific position of those who advocate the "cloned" man (cloning=using asexual reproduction starting with a mother plant). According to the conviction of competent molecular biologists, manipulation of the human genetic material with a resultant change in personality certainly will not be possible for 50 to 100 years, if at all. Yet, by that time, social conditions will presumably exist in the whole world which will make it unnecessary to want to use gene technological methods for solving problems which must definitely be approached on a social level. Today, "man made to order" seems more within the realm of possibility of current basic research. But the required experiments increasingly contradict human dignity and ethical principles. Is it not significant that modern medicine is accused of undermining the health of mankind, by keeping ill people alive and making it possible for them to have children, by precisely those people who completely misunderstood Darwin (social Darwinism)? Since, in their opinion, mankind is carrying a "genetic burden," they offer programs according to which human beings should be raised like domestic animals.

The view of the degeneration of mankind by technical and medical advances is plain nonsense. Thereby, we do not fail to understand that personality is by no means the result of social influence alone, but rather that it represents a very specific image developed from social and biological dialectics.[1]

The well-known Soviet scientist, Academician N. P. Dubinin, has taken issue, in a very clear and unequivocal manner, with the necessity and the possibilities, in the foreseeable future, of improving the genetic programming of today's man.[2] Dubinin recalls that many average people are and will be born to families of outstanding people, that the population masses are the source of outstanding personalities. At the present time, giving in to the new eugenicists (eugenics: improvement of the race) and allowing them to destroy the existing, valuable biological basis of mankind could have the most serious consequences. Thereby, he turns emphatically against the repeatedly and sensationally presented demands of the so-called new eugenics of the Western countries.

While such well-known bourgeois scientists as Th. Dobzhansky, B. Wallace and B. Glass (United States) are also warning against acting with excessive haste, the experimental geneticists presented their programs "for the biological improvement" of mankind. At the basis of this is exclusively the necessity to fit the human organism to the technology instead of the technology to man. The question is justly raised by B. Glass whether it would not be simpler and more reasonable to create the necessary environment and to let adaptation take place--as long as we do not know precisely our own nature and, therefore, are as yet not at all capable of distinguishing between "suitable" and "unsuitable," and between "better" and "worse" genotypes. Indeed the main difficulties and the currently greatest risks of genetic engineering are derived, above all, from the fact that science still knows very little about the genetic foundations of the human personality. One is nevertheless certain: there is no gene for morality. Man will become truly human through upbringing in an environment friendly to humans. It is equally certain that a social and biological unity is manifested in him.

Yet when we accept that, in the foreseeable future, man may be capable of influencing his inheritance in order to eliminate inherited defects, then should he not also be morally justified--under worldwide humanitarian conditions--to influence his own biological advancement? Should it not be the basic premise that, with gene technology, the individual possibilities will be expanded, thereby increasing the freedom of the individual, for instance, through improving the resistance to diseases? Illness is "life inhibited in its freedom," it is a limitation of the "totality of life expressions by man" (K. Marx).[3] Thus, why should it not be ethically acceptable some day, for instance, to eliminate certain skin diseases or allergic asthma by means of gene therapy, or even to influence the development of cancer?

What Is Already Practically Possible and Necessary Today?

These and many other possibilities are today only questions of basic research and not of application. Currently, the tasks of preventive eugenics take precedence and, at the same time, the preparation of gene therapy against a series of genetic diseases is in progress.

Special consideration should be given to the extensive and, at the same time, increasingly differentiated elucidation of the genetic basis of human life processes and the possibility of disease development. Human genetics, above all, is concerned with this. Of the 2,000 diseases known today in which genetic factors play a role, many are curable or at least largely controllable by medication, diet or surgery (diabetes, allergic diseases, clefts of the lip, mandible and palate, among others). The fact that, as a rule, disease is manifested in the interaction between organism and environment, presents mainly social-medical and societal consequences both now and in the future. Four of them will be discussed here.

Genetic Family Counseling, Instruction of Youth

Our human-genetic consultation stations in Berlin, Magdeburg, Jena, Greifswald, Rostock and Neubrandenburg are concerned exclusively with helping people by clarifying individual genetic problems and giving help with family planning decisions. Every one of our physicians here will advise responsibly and, in case

of doubt, will involve one of the above-named consulting stations. But it is quite possible that, if a child is desired, they will advise to go ahead in spite of a relatively high probability of it having a genetic disease if that disease can be controlled by therapy. Since gene therapy is simply not yet available to practice and may become applicable to only a limited fraction of hereditary diseases in the foreseeable future, prenatal diagnosis and, if necessary, counseling for abortion are the realistic possibilities and, equally, the medical responsibility rather than holding out hope for an eventual repair of genetic structures.

Care of Genetically Damaged People

The projects achieved especially following the eighth and ninth party conferences make allowance for the circumstance that, for instance, about 7 percent of our children live with some form of organic brain damage in our country. This group of people cannot meet the demands of society, or it can meet them only under special conditions. Under socialist conditions, the medical care, pedagogical training and purposeful guidance of this group of people is possible and imperative.

Sanitation, Purification of Air, Water, Soil

This task is primarily concerned with harmful radiological and chemical factors and must also include the "microclimate" (example: tobacco smoke), along with the testing of all chemical substances which come in direct contact with the human organism and can damage the genetic makeup. In this context, the emphatic demands by socialist countries for worldwide disarmament, especially the prohibition of atomic weapons and their testing, and also for the destruction of chemical, biological and other weapons are of the greatest humanitarian importance.

Contribution To Solve the Problems of Feeding the World

By recombination of genes through plant genetics to achieve useful plants, and by fertilization and modern soil cultivation, a relatively rapid, massive increase in plant protein production per hectare of agricultural land already appears to be possible. Another central point would be the raising of animals with specialized characteristics such as an unusually high milk production or a large meat yield.

In summary, let us conclude that, in comparison to prophylactic eugenics and of the gene therapy possible in the foreseeable future, utilization of genetic engineering to achieve a far greater regulation of the individual predispositions of man and the psychic characteristics based on them appears possible only in the framework of humanistic sciences with considerable participation of Marxist-Leninist philosophy, ethics, pedagogics, psychology and sociology. Such a future natural scientific project, which can be termed "genetic projection" in a positive sense--with reference to the pedagogic "projection of personality" by Makarenko--can be imagined basically only as a part of societal evolution in the mature socialist society. "The prospects of mankind are in the direction of social and scientific-technical progress in its unity.... Such a unity of social and scientific-technical progress will be provided on the social basis of Socialism and Communism."[4]

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PAPERS PRESENTED AT BUDAPEST INTERNATIONAL CONFERENCE ON MINI, MICROCOMPUTERS

Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 2

[Article by Attila Kovacs: "Mini and Microcomputers"]

[Text] In last month's issue we gave a brief report on the MIMI '80 conference held in Budapest in connection with the use of mini and microcomputers. In this article we want to give an overall picture of the program as reflected in several papers and, in this connection, to give a picture of the most recent achievements affecting the special field.

There were two chief questions at the MIMI '80 conference of concern to experts dealing more closely with domestic applications--what trends can one find in the use of mini and microcomputers internationally and domestically.

I would like to feature among the large number of foreign papers those which dealt with the role of mini and microcomputers in the control of robots, with parallel and problem oriented microprocessors and with multi-microprocessor systems.

K. A. Bejczy, of the Jet Propulsion Lab in California, famous for its achievements in space research, and Dr J. Plander, from the Technical Cybernetics Institute of the Slovak Academy of Science, gave very interesting talks about applications connected with robotics, character recognition and picture processing.

K. A. Bejczy said that we can observe an ever increasing trend in various uses of robots. Modern technology uses robots to extend, increase or replace the mechanical work of the human hand. Thousands of manipulators and robot hands are in use already around the world in nuclear, auto manufacture and other industrial areas. It had been imagined that it would become economical to use robots as a result of the increasing capacity and decreasing price of large computers. This hypothesis was proven false 5-6 years ago when it became apparent that general purpose, large capacity computers could not be used economically to control robots or to assemble the information related to this. These problems can be solved much more easily with minicomputers and even more with microprocessors or with the capabilities in these. The use of mini and microcomputers is a great aid to solving the problems of real time control and remote operation (teleoperator) of robots. The problems of robot control are complex and they can be approached and solved best according to multi-level control chema with divided, hierarchical structure. It also turned out that microprocessors have a crucial role in character

recognition. This is the only way to solve ideal character recognition applications in robotics within the framework of real time data processing. Because of the properties and economicalness of mini and microcomputers they will play an increasing role in the area of robotics also, in the development of control and intervention functions and of communication between man and robot. They can be used in many different ways and at many levels in robot control. They can be used at the lowest control level to improve the servo performance of the robots and at another level to realize the logical programs controlling the robots. At the newest levels, for example in task oriented control, the operator can even give the robot "intelligent" (functional) orders. Creating these important functions brings up the problem of research on multiprocessor systems.

Microprocessors make robots economical in the strict sense and make them "acceptable" in industrial applications. But there are areas where robots must be used independent of whether or not they are economical--a nuclear environment, deep sea research, space research, etc. In the developed capitalist countries the auto industry leads in industrial use of robots. It is not unimaginable that robots or robot elements will break into the textile industry or agriculture in the near future.

In the talk by Dr J. Plander we could hear how there is a need for parallel and problem oriented microprocessors with very fast operational speeds to handle the problems of artificial intelligence, character recognition and picture processing. The development of microprocessors and microcircuit technology makes it possible to develop parallel processor systems capable of high speed and transmission which are cheap, flexible and reliable and can be used in many fields.

In a paper summarizing the most advanced achievements the speaker divided the parallel computer systems into the following five categories: vector "pipeline" processors; parallel processor assemblies; associative matrix processors; algorithmic matrix processors; and algorithmic minimatrix processors. The most widely used parallel processors are multiprocessors with a so-called MIMD architecture (Multiple Instruction, Multiple Data stream). Finally the paper dealt with the possibilities of future applications of parallel and problem oriented processors in the fields of aftificial intelligence and robotics.

Several papers dealt with the hardware and software problems in developing multi-microprocessor systems. J. Aspelund, from the Technological University in Helsinki, said, among other things, that while software problems significantly limit the use of parallel processors in general purpose computers these problems are largely absent for special purpose mini and microcomputers having parallel processors.

Other papers dealt, for example, with problem oriented multiprocessor architectures which can be used for speech analysis and synthesis, with how to link a general purpose computer and a multi-microprocessor system, and with a multi-microcomputer system with a universally variable topology.

Of the papers given in the software section five were linked to domestic authors. In a paper titled "An Extended Concurrent Pascal Kernel For a Multi-Microprocessor System", J. Grof, E. Hincs and P. Kacsuk, of the Viedoton Developmental Institute, reported on their programming experiences with real time process control tasks in a multi-microprocessor system, describing the architecture of the multi-microprocessor system and the realization of the kernel functions. They also dealt

with a microprocessor software technology based on the CDL language which aids the development of large scale programs supporting structured programming; they dealt with increasing the intelligence level of terminals in a minicomputer network and with a user oriented program language prepared with a microcomputer system.

Hungarian experts gave eight papers in the applications section. Among domestic applications we can find a microcomputer system controlling a gas distribution network, the collection and processing of X-ray spectrometer data, multi-channel analysis equipment controlled by a microcomputer, microcomputer EEG tests, etc.

I consider noteworthy several statements of Dr Kohler (Erlangen University, FRG) in connection with microprocessors. Today every single measuring device newly planned and manufactured has built-in microprocessors. A new age has begun for digital voltometers, precision thermometers, electronic counters, signal generators, oscilloscopes and other measuring devices. For example, in the past 3 years Hewlett-Packard has developed about 100-150 new microprocessor, intelligent measuring devices. There is ever increasing use of microprocessors in household machines and vehicles. In his opinion, within 3-5 years, every single new car will have 3-4 built-in microprocessors carrying out various functions. Thus it can be imagined how many microprocessors will be used in this area. According to the manufacturers of integrated circuits it can be imagined that within 5-7 years it will be possible to produce on a single circuit chip a unit corresponding to 100 Intel 8080 microprocessors. The big question is what can be done with such a complex circuit, how it can be handled from the software viewpoint for example, etc.

The round-table talks dealing with the software problems of mini and microcomputers raised the level of the conference.

In his debate initiating talk Dr Lajos Rozsa (of the MTA SZTAKI [Computer Technology and Automation Research Institute of the Hungarian Academy of Sciences]), citing well known sources, said, among other things, that in 1979 trade in 4 bit microprocessors came to 50.4 million units while trade in 16 bit microprocessors came to 617,000 units. According to these same sources many of the potential users of the new generation 16 bit microprocessors do not understand how to design systems using such complex units. Writing the very complex unique user software is a serious problem. The round-table talks brought up processing using non-procedural languages, which offer great help to users. There are already achievements in England in this area (the BADSOCKS language). Several mentioned the importance of standardization; this must be realized at the level of manufacture. Standardization is also important in such areas as, for example, the linking of multi-microprocessor systems. One can distinguish two types of users of microprocessors--the manufacturers of so-called OEM devices, who build microprocessors into their own equipment, and the so-called final users who want to use them as a sort of "black box" and who have no experience in computer programming. The situation still is that the majority of microprocessors can be programmed only in the ASSEMBLER language. It would be much more convenient for the final users if they could work with more "humanized" instructions. Recently consultation offices have been opened in the countries leading in the manufacture and use of microprocessors; the problem with these, for the time being, is that they represent the manufacturers rather than the users.

There are signs that within 3-5 years there will be a large number of 32 bit microprocessors on the market; these will have a capacity equivalent to a contemporary minicomputer. Naturally it can be expected that these microcomputers will be programmable in FORTRAN, COBOL, PL/1 and other high level languages. It may be that within 5-8 years these units will have their own translator programs realized as hardware.

At the end of the conference I asked several experts how they evaluated its level.

K. A. Bejczy: "One can find the themes figuring here at other conferences also; the papers of the experts from Hungary and other Eastern European countries reflected advanced thinking. I am thinking here of the problems of distributed or multiprocessor data processing. I see a difference, in comparison with other conferences, in that there, there is a large and fairly well defined market behind the participants. Comparing the participants here with the participants in other conferences one can find a similarity in the fact that dealing with computers is a personal adventure for all of them."

H. Kohler: "The professional level of the conference corresponds to that of other Western European conferences but in regard to the themes of multiprocessor systems the level of the American and Japanese conferences is higher. Technical-scientific applications were in the foreground here. In this area we heard of many new, interesting applications. We could not expect at this conference an answer to a uniform solution of the general software problems affecting microcomputers."

All in all, the MIMI '80 conference held in Budapest--even if it could not give an answer to all the most important problems connected with use of mini and microcomputers--was useful from the viewpoint that it permitted a comparison of domestic achievements and problems in the manufacture and use of mini and microcomputers with the achievements and problems in this area of countries playing a leading role, permitted a comparison with the possibilities of the future.

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PROPAGATION OF COMPUTER-ASSISTED TECHNICAL PLANNING DISCUSSED

Budapest INFORMACIO ELEKTRONIKA in Hungarian No 5 pp 244-247

[Article by Ivan Nagy, an engineer of the National Technical Development Committee (OMFB): "The Tasks of Domestic Propagation of Computer Assisted Technical Planning" (on the basis of the draft conception OMFB 16-7602 Kt)]

[Text] Computer assisted planning received great impetus with the formation of the AMT [automated technical planning] work group created on the basis of a resolution of the Intergovernment Computer Technology Committee. Hungary has undertaken a significant part in the work of expert conferences dealing with electronic, electrotechnical, machine industry, construction industry and general AMT questions. The article contains several themes of the draft conception for propagation of computer assisted planning. (Received 26 June 1980.)

Introduction

The scientific-technical revolution has accelerated the development of products and of technological processes; as a result of the variety of them is increasing at a great rate. Products and technological processes must be replaced more quickly, and this increases the need for work connected with preparation. This phenomenon makes it necessary to increasingly include in technical planning the methods of computer assisted planning in order to ensure the economicalness, utility and marketability of products.

The accelerating innovation process and, as a result, the necessity of modernizing the product structure and of the development of specialization have led worldwide to a great increase in technical planning. The spread of computer assisted planning methods is made necessary by the growth process and is made possible by the tools of computer technology.

The economicalness of products or construction solutions is greatly affected by the circumstance that computer procedures make possible the working out of alternatives. The economic comparison of several alternatives makes possible the economic optimalization of them, which can have a very significant effect on production or investments and reconstruction. Computer assisted technical planning--as a result of the technical possibilities in it--makes possible the very desirable planning of several alternatives, or mathematical optimalization, without extra throughput time or manpower expenditure.

Planning requires an ever broader information base and swift access to the data of it; this includes the tasks of technical preparation for manufacture also. The planning needs for preparation of production and development are increasing quickly also. Such use of data bases containing technical and economic data places new requirements before the development of these data bases also.

The work required for technical planning is significant in quantity also. As a result of the constant increase in quality demands being made of planning this quantity increases quickly, practically independent of the growth in production in industry and the construction industry. Since the Sixth Five Year Plan does not prescribe an increase in planning personnel, indeed it even reckons with a slight decrease, the tasks can be carried out only with the technological development of planning, including increased use of computer technology.

In this area we must also pay attention to the developmental trend in other countries. On the foreign market, primarily the capitalist market, one of the factors of competitiveness is a swift transmission of bids and flexible adaptation to the needs of the customer. The desired speed can be achieved with adequate certainty only with the aid of computers. There is already domestic proof of this in the area of construction planning.

The time required to work out a design also has a strong influence on the competitiveness of products because goods which reach the market late lose the character of novelty and are sold at a disadvantage. So in the interest of ensuring a market it is important to bring into harmony the time when products can be sold and the throughput time for the development of newer products; in the contrary case plans for modern products cannot be developed in the throughput time required by the world market. This task can be carried out only with the aid of computer assisted planning.

The complexity of products is constantly increasing and so the effective planning of modern products and technical manufacturing preparations can be less and less realized with traditional methods.

Modern computerized production guidance and process control methods require computerization of the planning phase. We can thus develop automated planning-manufacturing-control (TGE) systems.

In addition, competition on the world market demands paying attention to various prescriptions, an awareness of patents, the availability of parts and subassembly catalogs, etc. which in turn becomes possible via computer assisted information systems. This is especially significant for enterprises selling on several markets, because of prescriptions which may differ from country to country.

In general we can distinguish three stages in the use of computers:

--performing labor intensive, complex technical calculations with a computer;

--computer assisted technical planning; and

--complex computerized planning systems.

The tools available have changed in the course of the development of the methodology for automated technical planning and thus the conceptions have changed also. In the beginning for example--lacking graphic computers--connection diagrams prepared with printers were standardized. Today we should regard an interactive graphic engineering facility as an achievable goal. In the age of expensive large computers making possible only local batched processing small desk computers became very popular; the planner could regard them as his own tools, he could get access to them easily and did not have to use an intermediary. It is now possible to develop multi-terminal systems providing remote data processing and planners can be provided with their "own" alphanumeric or graphic terminals the operation of which is made convenient by ever more efficient software products. The creation of nets is also appearing among the developmental goals. In this way the local small computers can be connected to large computers handling large data banks and complex program packages.

As a result of price changes for smaller computers many planning and university institutions have begun such an orientation (SZM-4, TPA 11/40, DEC PDP 11-line, R-10, R-11), naturally in the multiple user operational mode.

Antecedents

Following the example of developed industrial countries, the use of computers for tec-nical calculations and planning work began in Hungary in the 1960's. Progress was along two lines, partly with the aid of medium computers (GIER, Elliott, Siemens) and partly with the aid of small desk computers (primarily Hewlett Packard, Monroe, Wang).

Significant developmental work began in a few areas after the period of initial testing, and several focal points developed. Such an area was the designing of electrical circuits, primarily the computer planning of NYAK's (printed circuit sheets). Several research institutes and university faculties developed programs for this purpose. This work created a base for the development of a larger, more comprehensive planning system.

In the machine industry developmental work began in the area of technological planning in connection with the spread of NC [numerica-ly controlled] machines. Simultaneous with this there developed a conception pointing toward integrated manufacturing systems. Since tools making possible modern, graphic screen, interactive planning were not available researchers began to develop a group of their own tools.

In the construction area the themes cultivated for the longest time were connected with static calibration, which then spread to construction machine planning and the computerized planning of construction systems. Since accessible computer types were not developed, a development in two directions was decided upon. In the first place a large (medium) computer was set up as a central computer for branch planning and in the second place small computers were made available to provincial planning institutions. Program development began in both directions. At the same time computer assisted planning began for road, railroad and water engineering construction. Significant results were achieved in the planning of the metro.

Developmental work was done in a number of special areas also, which was called on to satisfy the needs of individual institutions. These were used in chemical

industry and food industry planning, theplanning of lighting and electric networks and machines and the planning of machine elements (for example, cog-wheels). In addition to technical calculations there were computer assisted calculations of investment economicalness and budget management work.

The computerization of several unique special areas began also (for example, geodetic work and preparation of maps).

Activity in the Area of the SZKB [Intergovernment Computer Technology Committee]

The coordination and central support of research and development work received a great impetus with the formation of the AMT work group in 1974, on the basis of a resolution of the SZKB. Counting on international cooperation and division of labor, very lively work began in Hungary in three or four special areas. The initiation of the work was favorably influenced by the fact that at that very time we were finalizing this part of the Fifth Five Year Plan of our homeland and so it was possible to realize a central influence. The Special Computer Technology Research Program prescribed the functioning and coordination of the chief areas of AMT. Thus, among the general themes of AMT, they decided on a detailed working out of questions connected with AMT instruction. An AMT instruction committee was formed and preparation for AMT instruction, or the training itself, began in several technical universities.

Computer assisted technological planning and manufacturing preparation became an organic part of the technological development of the Hungarian machine industry. The plan included preparation using MSZR [Minicomputer System] as well as ESZR [Uniform Computer Technology System] computers. Our local conditions and the developmental ideas of our machine tool industry placed the emphasis on the area of metal cutting operations. General software development work began to develop monitor systems and to facilitate strength calculations within the frameworks of the machine industry AMT.

In the construction industry AMT we should mention among the architectural engineering themes the planning of the structure of large panel buildings, the planning of heating and ventilation systems for industrial buildings of a given volume and, among civil engineering themes, the planning of highways and girder and frame bridges.

Within the framework of electrotechnology AMT Hungary undertook a significant role in the areas of designing electronic circuits, cards and filters. It is chiefly responsible for developing program packages for circuit analysis, logical simulation and program packages carrying out a number of similar tasks.

Activity dealing with the automation of the planning of computers is also being done within the framework of long-range research work.

To prepare for medium-range planning the OMFB has worked out several studies and one draft conception for the propagation of computer ass-sted technical planning.

The AMT work committee of the SZAT [Computer Technology Applications Development Society] was formed this year, creating an official domestic forum for the coordination of work being done in various areas and for the debate of developmental

plans. Its work plan includes, among other things, attending to international cooperation, compiling registers of user program packages and making proposals for programs to be imported.

The effect of computer assisted planning is spreading to the development of manufacturing and control also. They are developing TGE systems (for example in the electronics industry) and CAD/CAM (computer aided design/computer aided manufacture) systems (for example in the machine industry). Computer management of budgets represents a great aid in construction industry production guidance and they are developing computer data banks for construction systems which can be used by all those interested, from designer to contractor.

The growth in the feasibility of computer construction, the increase in the performance/price index and the increase in user needs and expertise provide a good foundation for the spread of computer assisted planning. Despite the fact that thus far economic profit can be demonstrated for few industrial applications, the first convincing results have appeared already in the undertaking of export deliveries.

Selection Criteria

In selecting areas to be developed and in setting research and development goals we are taking into consideration the following criteria:

--Technical necessity for technological reasons. These are areas where the traditional planning methods can no longer be used. This includes, for example, the design of integrated circuits.

--Increasing economic competitiveness. These are areas where it is necessary to shorten planning and manufacturing times in order to preserve market competitiveness. This includes, for example, the ship building industry and the electronics industry.

--Planning more economical designs. In these areas the more precise computer calculations make possible the production of material conserving and energy conserving designs, equipment and products. This includes, for example, architecture, bridge construction and the manufacture of hoisting apparatus.

--Preparing a large volume of plans in a short time. In these areas an economic basis is provided by the need to solve the limitations set by finite manpower capacity and to adapt to the consequences of work peaks. This includes, for example, the planning of installations, where a large volume of blueprints and estimates must be prepared in a short time. For example, when a series of axonometric pipeline drawings must be prepared.

--The necessity of preparing plan variants. Preliminary economic calculations for investments must be prepared in a number of variants in order to prepare for decision making. It is useful to do this work, which requires many data and calculations, with a computer. In the course of technical planning it is possible to calculate several variants, develop various designs and seek the optimum.

--The technical development, importance, intellectual preparedness or receptivity of the given area, the developmental capacity available and the possibilities given by the assets.

Application Areas

The long-range developmental conception reviews the several special areas and provides guiding principles for development. Taking the application areas in turn, and without trying to be complete, let us list the chief goals.

1. In geodetic and cartographic planning we want to spread the technology of digital map preparation. We are planning to use the micro data bank technique for this. Fitting the survey methods to computer data processing is an important developmental theme. This included automatic interpretation of air and space photography.

2. In regard to civil engineering tasks we are considering primarily the development of computerized techniques to aid transportation and public utility network planning by developing interactive, complex program systems. In the area of structure planning we want to achieve interactivity of dynamics calculations and a simplification of multiple stage calculation methods.

3. In the area of building design the automation of construction systems will come to the fore. An officially coordinated program library, control rules and approval procedures must be developed for this. The development of the complex planning programs begun in the present plan period will be continued and we plan to spread them. In the course of development we must take into consideration the requirements of compatibility within the computerized guidance systems of the contractors.

The preparation of estimates is a phase of both civil engineering and architectural engineering planning which requires significant work. The computerization of this phase is going forward with great strength even now and it must become general after the conditions have been created.

4. The coordination of developmental work being done in a number of places is the most urgent task in one area of machine industry planning, product drafting and design. In addition to this the other direction of development is broader use of modern dimensioning procedures, for example use of the method of finite elements. The planning of chemical industry equipment and pipelines will be aided by computers. We have good experiences and developmental plans especially in strength calculations and in the preparation of pipeline plans. In connection with machine industry planning we should also mention the computerization of operation planning and technological planning, which is going forward at a high level.

5. We can regard electric planning as the best developed area in our homeland. The development of planning systems largely based on MSZR computers is going forward with great strength. The import of suitable graphic devices represents a difficulty. The planning systems are being put into industrial plants and hopefully we can even count on economic results in the Sixth Five Year Plan. The system for designing printed circuit sheets, the first to be developed, will

be further developed for designing integrated circuits and equipment. In the area of the latter the planning of computers is in the most advanced state.

In regard to other electric planning tasks the computerized design of electric motors and distribution networks is under way or under development.

6. In light industry there are domestic experiences and developmental plans for computerized design of patterns.

7. Computer assistance to the manufacturing planning process has begun in several areas. The development of simulation methods to plan technological processes is under way and program systems have been developed or will be developed further for the simulation of chemical industry processes. Work is being done on the several elements of a complex computer system for manufacturing planning (development of a warehousing system, data bank handling system, etc.). For some time already several planning institutions have used computers to do the evaluation calculations for the investment preparatory phase. This includes computer aid for general planning and the development in this direction of the general planning institutions.

8. In the construction area settlement planning and space planning incorporate the most complex technical planning tasks. Computers should be used to assist the planning of new settlements and urban areas, the development of agglomerations, and regional planning because many data and special areas must be brought together. Another characteristic of this activity is that the planned technical system must provide, throughout its entire life, for the functioning of the development and for transformations adapting to needs with a permanent planning character. Such activity includes, for example, a registry of public utilities.

The development of simulation methods is under way in this area also. The development of regional data banks is under way.

9. We are also turning great attention to questions of uniformization, standardization and classification and we are developing planning programs in coordination with the ESZKD [expansion unknown] of CEMA. Circumspect caution is desirable in the area of standardization as a result of the immaturity of the tool system.

A special area is industrial mold design, where we are looking at the possibilities of using computers.

Data Banks

A number of data banks have to be used for effective propagation of AMT. An example in machine industry planning is a store of technological data, which should be developed as a national information center. One of the most important data banks for installation planning is the collection of construction cost norms (IKN), which is the basis for preparing estimates. The question of the data banks needed for planning goes beyond the theme of AMT strictly speaking but their mutual effect will be very strong if computer technology methods spread widely. This also includes the professional literature information systems, but an independent organization, the NTMIR [International Scientific Technical Information System] deals with these.

Tools

An important question in looking at the supply of tools is to forecast the hardware supply. The small computer-large computer competition and the relatively narrow selection of peripherals needed for planning make estimates for any more distant future most uncertain. The hardware devices needed for planning include the alphanumeric CRT terminals intended for general use as well as graphic displays, drum and plane drawing machines, COM [Computer Output Microfilm] equipment and digitalizing equipment. In general we are looking for one large device per planning office and one terminal per planning unit by 1990.

Instruction

The theme of university instruction in AMT occupies a very important place in our thinking. According to our prescriptions conditions must be created in the technical universities so that beginning in 1981-82 every graduating student will be able to get basic information and practice in AMT. In parallel with this care must be taken to create conditions for such training and further training for practicing engineers. The ministry of education is providing state assignments to aid the realization of this aspiration.

It is not difficult relatively speaking to plan general software supply because whatever hardware is obtained there is need for the development and adaptation of special user software. Two difficulties must be overcome in the transitional period. One is overburdening due to basic software deficiencies and the other is to shift developmental work aimed at batch mode processing to the use of the interactive operational mode.

We attribute very great significance to international cooperation in the area of user software. Our homeland is a small country but computer assisted planning is used in virtually every branch. It is inconceivable that we should develop user programs in every area on our own. We want to develop our supply of user programs on the basis of a rational division of labor with bilateral and multilateral international cooperation and the purchase of programs.

A computer technology applications development fund has been established to aid the purchase of programs; a part of this can be used, as needed, to obtain programs aiding technical planning. Naturally we support the adaptation of those programs and systems which can be used by several users.

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MODEL COMPUTER SYSTEM PLANNED FOR PUBLIC ADMINISTRATION

Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 1

[Text] The meeting convened in September by the Computer Technology Application Committee of the Office of Councils of the Council of Ministers featured discussion of the updating of council case handling, modernization of data processing and the information system and the possibility of utilizing computer methods. At the meeting, the program evolved by members of the Public Administration Organizing Institute for developing a model computerized information and data processing system for districts and counties was discussed by officials of the public administration apparatus and computer and information specialists from the various portfolios. The plan sets forth the agenda for a decade.

The objective is to lay the computer network basis for a regional guidance system making use of the capabilities of computers. It is well known that various portfolios, industrial branches and some county councils have established data banks. However, at present the languages of such computer systems differ. The county computer centers must "speak the same language."

One important task of the 10-year work plan is development of model information systems. The need for this was stressed by both Lajos Pesti, deputy director of the Central Statistical Office, and Miklos Raft, deputy director of the Office of Councils of the Council of Ministers who is also head of the office's Committee of Computer Technology Applications. Work on the project will soon begin in Bacs-Kiskun, Heves, Nograd, Pest, Szolnok and Zala counties. These choices were made on the basis of the counties' achievements in computer organization. During the trial period as well as in the future the information and data processing apparatuses of the national administration computer networks, and the computers of the councils as well as those of the various portfolios will serve as the computer bases of the system. A detailed work plan for the program is to be completed by the end of this year. Implementation is expected to reduce administrative work, result in flexible handling of cases while feedback of council information should improve the standard of planning, management and administration.

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UPCOMING TASKS OF ELECTRONICS INDUSTRY

Budapest MERES ES AUTOMATIKA in Hungarian No 9, 80 pp 325 - 329

[Article by Istvan Littvai, deputy minister of metallurgy and machine industry, speech delivered at Fifth National Conference on Electronic Instrument and Measuring Technology, 18 March 1980, as the opening address: "The Upcoming Tasks of the Electronics Industry"]

(Text) The purpose of the Conference is to appraise the development achieved within the area of this subject matter in developing and manufacturing domestic electronic instruments since the last conference and to become familiar with new achievements. Even the trend of the groups of subjects during discussion for the Conference indicates the development which has taken place in this field in our country in developing modern measurement instruments and systems. The subject matter is current, important and interesting, and proof of the interest aroused among specialists can be seen from the large number at the Conference. Approximately 300 specialists will take part in the reports, discussions and round-table debates.

The idea of development of the electronic industry is based on predicted trends. Such predictions are developed by the OMFB [expansion unknown], the KGM [Ministry of Metallurgy and Machine Industry], and other agencies which have elaborated the directions of technology and economic development within the problem area. However, I am overlooking this information for two reasons: first, it is apparent from the agenda of the Conference that you will deal with modern and progressive questions falling within the framework of the predictions mentioned, and secondly I would prefer to use the time available to speak of what must be done, about the implementation of the plans being prepared on the basis of the predictions.

Naturally electronic instrumentation and measuring technology play a role in the major questions of the development of the electronic industry as one of the minor, but very important parts of the industry. The level of measurement technology is not only a measure of a national industry, but it is also one of the determinants in the activity of research development, production and concomitant activity.

The concept of measurement today does not only apply to the idea of instrument taken in the traditional sense, but to the measuring process meeting the rather complex demands of information acquisition and processing. When we speak of the measurement process today, it includes the entire information servicing system from sensors, through data transformation and transmission channels to the processing of the measurement data. It is natural that we must prefer, in accord with our known domestic resources, a complete measurement system in which mental work has the larger part, but we cannot neglect those units which are the basis of the systems and which in particular are marketable. Of great significance is the IEC interface, which has spread throughout the world and with which we can realize accomplishments, as well as other well-known accomplishments, for example the Camac system, each of which has its own proper area of application.

In addition to giving attention to these viewpoints, we must be careful not to examine the road to be followed in economically effective development with a bias. Although the level of measurement technology can be determined to a certain degree, such as in industry activity, this still does not mean that we can solve every emerging measurement technology problem of the entire country with instruments of domestic manufacture. On the contrary we must count on a strong development of internal production systems in the branch manufacturing measuring instruments and tools with the heterogeneous structure of production and technology of manufacturing of today. The proportion of measurement instruments representing simple mass production is dropping significantly, they are oriented toward socialist import procurement, and our domestic cooperative industry will be able to satisfy fewer requirements. The objective, in addition to maintaining the geodetic and geophysical, as well as the vehicle, inspection and nuclear base, is for a large part (two or three of the cooperatives of major capacity) of the current manufacturing base of our instrument industry to be converted into instruments and instrument assemblies characteristic of complex electronic measurement technology representing a great deal of mental value. These can also be counted on to a greater degree for utilization of computer technology results, as well as with respect to applied and manufacturing technology. A definite area of technological measurement installations (possibly with respect to licensing) can be applied to eliminate capitalist imports intended for domestic investments. The degree to which this goal is achieved also determines the dynamics of development.

Within the scope of an article it is not possible to deal with ideas in detail, but only to outline them. Even details cannot be presented reliably, because they naturally require more elaboration afterward. Technical experts can perform unusually valuable service in this regard by dealing with the economic reality of technical questions in their discussions on this matter, while constantly keeping our resources in view. Along with the data, such questions should be given attention as marketing barriers, import procurement, and so forth, as well as the advantages which come into the program through the development of uniform

installation and measuring technology in the branch manufacturing communication technology, in which the specialized field of the Conference discussions can seek and play a significant role.

Similarly it is worthwhile to devote some attention to the developmental trends expected in other areas of the electronic industry. The current mechanical realization of the cash register product group will yield to an electronic solution, based on computer technology results, which will give the system an increasing amount of freedom.

We can count on a significant increase in production dynamics in the area of medical instruments and equipment. It will be possible to expand the delivery of complex medical systems to the primary consumer level. The proportion of electronic products in the automated, controlled technology branch of manufacturing will increase, and the use of computer technology in these systems must be constantly expanded.

These objectives refer quite directly to the individual areas of the electronic industry, but an area constantly broader than the desirable changes in the structure of the electronic instruments must be taken into consideration.

It could be thought that this is a task without a solution, because measurement is connected with every branch of the national economy, industry, agriculture, communication and so forth. In truth it is possible to find some emphasized developmental tasks, emphasized because of their national economic importance, and these can obviously be given preference if this corresponds with the already mentioned conditions. The criteria are constant, so that first we are dealing with complex measurement systems, and within them modules which can be put to use in reliable measurement processes for routine examination under laboratory, diagnostic and observation conditions. It is particularly valuable to mention the very demanding research instruments with which many research positions in higher education, academies and industry, from the Budapest Techical University to the Central Physical Research Institute, are operating.

Let us look beyond these to the signposts which have already been set up. Among these the most important are the following: National Central Research Developmental Plan, commonly known as OKKFT from its abbreviation, the various Central Developmental Programs and the technical developmental priorities. I do not wish to enumerate all of them, but some are worthy of special mention.

Among the topics of the OKKFT are, for example, aluminum metallurgy, machine manufacturing technology, other agricultural and food industry topics, complete electrical energy and industrial systems designed for export, drugs and pesticides, and so on. Five OKKFT subjects are closely associated with the electronic industry:

-- Computer technology manufacturing and application subjects,

-- Microelectronic components, and

-- Communication installations and automated tools and systems.

These latter subjects show the emphasis in support of the main developmental questions of the electronic industry from the research and development side.

The electronic industry also plays a very important role in the central developmental programs, much fewer in number, first its computer technology components and secondly its electronic components, which are in the process of development by means of a partial assembly program which will be spoken of below. If we were to make more comparisons between the OKKFT topics and the central developmental programs, we would find more examples of clearly recognized connections. For example, the subjects of drugs and pesticides can be found not only in OKKFT, but also in the central developmental programs for drugs, pesticides and intermediate manufacturing. Among the technical developmental priorities we can also find some which are important from the viewpoint of the electronic industry, namely automation, provision for components and partial units, and the development of complex systems.

It would be naive to think that even owning a complete list of the various emphasized products would make it possible to outline the sequence of types of electronic instrument and measurement technology to be developed, but there is no need of this. We know, not only from the instrument catalogs of the international companies, but in a careful way from the directions of measurement apparatus and measurement systems in preparation and development in our country, the wide range in which modular developmental systems can be used, by developing single or several newer modules in newer areas of application and integrating them into a system. I would not like to make it appear that this concerns only measurement systems, but, as I have already mentioned, it also concerns objects representing a great deal of mental value, objects which can be single technological instruments for a definite purpose. I do not wish to keep repeating this, but I do want to protect all of us from a one-sided attitude which could be of unprecedented danger in planning a developmental strategy.

When we speak of a certain degree of standardization, naturally a reasonable one, of measurement apparatus, families and systems, it is not sufficient to examine it only from the viewpoint of a rather narrow sector, but rather within the scope of the entire electronics industry. It is not necessary to go into detail on this point here, since I shall later outline the deficiencies of the current situation, and you can easily deduce the necessary and possible implications. Standardizing components and partial assemblies is a question which involves the entire electronic industry more closely than in the past.

The thought of development of types, standardization and normalization, as an effectual instrument to increase efficiency, does not refer to hardware alone in your area of specialization. The large mental value, which we have established as a direction to be followed, does not appear in hardware alone, since software often bears a significant and frequently decisive weight. Therefore it cannot be surprising if I stress the idea that software development specifically requires disassociation from parallel work, and the application of results achieved by others. This is not a new idea in the sense that we are dealing with it. Efforts have already been made in the interests of using microprocessors and high level languages to reduce the prime costs of software products. Software questions still appear in some national programs, but we are only at the beginning and far from comprehensive solutions. At any rate this Conference can be a forum for this question and assist in developing an attitude striving for unity and cooperation.

Every decision must be based on deliberate technical and economic examinations which take into consideration the marketing possibilities as well as the research and development, planning and manufacturing tasks. The question as to what is needed for the complex and therefore expensive instruments has not yet been settled. Market research, customer service and feedback from them is basically important, but the largest international companies today are focusing on well-established service networks, along with constantly improved reliability of components and installations, in their marketing work. I do not wish to spend more time on this question, since everyone knows it in theory, but consistent fulfillment of it is necessary. Good examples already exist in practice but this is not enough, and it should become the general practice.

After these matters, it will be worthwhile to speak in a little more detail about our current domestic reality. What I want to say here refers to the entire electronic industry and is not specific to a technical branch, and what has been said so far could hardly be termed so anyway. Let me state that I will deliberately speak only of those phenomena where there are things to be improved.

-- The technological level of our electronics industry is significantly behind the international vanguard. After the development in computer technology manufacturing which took place in the Fourth 5-year plan, the current plan period provides for further development in only four areas. However, these are only preliminary bases for the development of modern electronic technology. In addition to the lack of developmental resources, our technological development will be basically affected by the fact that no inter-enterprise contacts have yet developed in our country to make standardized implementation of the technological integration necessary in the electronics industry possible. The main reason for this is that the production of the Hungarian electronics industry is approximately one-third to one-fourth that of the developed western enterprises.

-- The structure of the products from equipment manufacturing are exceptionally heterogeneous, and the necessary structural relationship between them, necessary to form a product system or a product family, does not exist.

-- Research and development efficiency is generally low, there are no uniform developmental principles, the transition time is long, brain power is divided among many developmental subjects, and at the same time identical developments are being conducted at different places.

-- Decentralized, directionless development has produced structural elements, equipment and partial assemblies differing with respect to factory and production, and every enterprise has outfitted itself for their vertical production.

-- Industrial standards and a useful assortment of electronic components have not been developed, and therefore three times as many varieties are used as would be justified on the basis of foreign experience. This causes serious concerns about acquisition, delivery and stockpiling.

-- The structural deficiency and the deficiencies in the assortment of equipment and components have increased the parallel technological nature of the industry, although it is exactly the new technical directions which make the development of technological specialization and the basis for common equipment and partial assembly manufacturing possible through the industrial technological expertise.

-- Because of the lack of interest among the enterprises the unjustified parallel manufacture of finished products has not yet been discontinued.

-- It is more and more possible to sell communication, computer, medical and automated installations in a complete system. Except for a few enterprise capabilities (for example, MEDICOR), the planning, shipment, contracting and servicing of complete systems has not been settled. The reason for this, in addition to structural problems, is the lack of interest and the isolation of the enterprises.

-- The level of marketing work differs greatly from one manufacturing branch to another. It is greatest in those manufacturing branches where collective marketing apparatus is available, but even the highest level is below foreign levels.

In various forums with leading experts in the professional scientific and technical areas and in the enterprises we appraised the inconsistencies between the developed position and circumstances, and saw with great concern the emergence of a risk of backwardness and decline in the specialized area.

The contradictory situation appearing in the development of the electronic industry was visible earlier, and a technical and economic concept began to develop with the aid of interested MTESZ [Federation of Technical and Scientific Associations] associations, which I take pleasure in thanking here.

It follows from an appraisal of the situation outlined here that, despite the current organization, technological level, readiness to cooperate, ability to collaborate, marketing work and large-scale unification of partial assemblies characteristic of the electronic industry worldwide, the developmental opportunity of the domestic branches of electronic specialization would dwindle without the modern structures and component development necessary for this unification. We would not be able to give a rank to those requirements which the long-range demands of the national economy will determine.

Further development can only be conceived in a selective way by suitable concentration of resources. The resources of the enterprises and the national economy are no longer limitless with respect to full vertical development. I have already touched on the question of collective partial assemblies and equipment, but the most fundemental question concerning the entire electronics industry is a solution to the component problem. The area of electromechanical components is also to be included, in addition to the active and passive components.

A real milestone in solving the component problem of the electronics industry was the decision of the State Planning Commission, on the basis of which the Electronic Component Central Developmental Program must be elaborated and submitted to the Council of Ministers by the middle of this year. Those who have carefully followed the large-scale, rapid development following the adoption of the Computer Technology Central Developmental Program can really appreciate its significance.

We shall consider the Program being prepared in its practical steps. Within the framework of the Hungarian Communications Technology Association, but separately, the KGM (Ministry of Metallurgy and Machine Industry) created the Electronics Central Developmental Program Office, under the direct supervision of a deputy minister, with its first task being the preparation of the above-mentioned Central Developmental Program. Within the Program Office, the program preparing working group will primarily perform this task. The "working group" name means that it and the other working groups will work with the initiative of the interested parties. There are two other working groups in the Program Office: the "Component" working group and the "Standardization, Collective Basis" working group. Their area of assignment can be seen from their very names.

As is known, the domestic electronic component industry is seriously lagging behind the internation vanguard. In componentproduction (excepting

a few types of components produced in small quantities) the types of components useful for the daily needs of industry and meeting less stringent requirements are determinative. Often the reliability of the components is insufficient. In practice the generation change was accepted only with the manufacture of second generation elements. The third generation, the manufacture of integrated circuits, has still not been solved, and nationalization of equipment measurement has only been achieved through imported elements. The situation in the manufacture of electromechanical elements is approximately the same.

Some special component manufacturing companies, as well as monopolies dealing with the manufacture of electronic apparatus, have available an active technology of component manufacture. Comparison based on examination shows that the size of the Hungarian electronic installation producing industry renders it possible to maintain a modern electronic component industry on a profitable level by using opportunities to cooperate with the socialist countries.

The primary aim of development is an expansion of the large-scale capacity of the semiconductor industry on the level of modern technology. In addition to a broad expansion of the product structure, development is not oriented by type but by technology. An effective exchange of assortments can be developed with the CEMA countries through the implementation of modern technological IC [integrated circuit] element manufacture and an equipment base, by dividing the types of integrated circuits according to medium and high complexity.

The basis for manufacturing passive components and electromechanical elements and equipment (connections, terminals, structural frames), meshing with microelectronics, must be developed. Development in these areas requires a sharp increase in automation and mechanization.

In enumerating the working groups operating within the Program Office, I already mentioned several tasks which must be completed within the scope of the Central Developmental Program in addition to components. In this area we are planning the development and implementation of a standard, typed program (partial assemblies, installation and measurement technology, design-manufacture-control systems and so forth) having a fundamental effect on the efficiency of the electronic industry. The objective is to incorporate approximately 40-50 percent of production in the standardization process in the manufacturing branches of the electronic industry manufacturing installations by the middle of the 7th 5-year plan period, thus after the next change in structure. For this purpose it is necessary to gradually create (or to designate in existing organizations) industrial collective bases and manufacturing plants which can organically insure the production of standardized components, partial assemblies and equipment for the benefit of the industry.

In the industry manufacturing electronic installations and apparatus, with respect to all manufacturing branches, there is an unusually large uniformity or at least a related trait to be found in the area of
-- the structural elements used,
-- the basic technologies and manufacturing instruments used, and
-- the design methods.

One of the key questions in implementing the technical and economic concept spread over these three areas is fulfillment of the standardization program to be imposed on the entire electronic industry. Uniformity must be created for the unnecessary and excessive deviation, and standardization must assure the possibility of gradual suppression of uneconomic, parallel manufacturing activity. To a great degree this will assist in significantly raising work productivity and efficiency.

The advantages of standardization and development of types is that:

-- Serial production will be increased in the component industry and production will become more economic.

-- Varieties of material will diminish, and this will favor the manufacture of other basic materials.

-- Enterprise stocks can be decreased by implementing efficient central stockpiling (material and components).

The manufacture of standardized components, equipment and partial assemblies of a universal nature can be reduced in manufacturing installations and even eliminated in many respects.

-- In addition to maintaining the specific structural element manufacturing characteristic of the manufacturing branch, the production process will be characterized by decisive completion of apparatus and of measurement work. This will have a significant production increasing effect on the level of the enterprises.

-- Technical and technological specialization can be implemented. Everything will be manufactured where personnel, instrument and other conditions are available optimally and with the most economic utilization, or where they can be guaranteed.

Dear Readers:

Many of you already know what I have written about. I ask you to overlook the repetition, but probably not all of you were in a position to become acquainted with the developmental concept of the electronic industry, at least [illegible] such detail. However, implementation of this program is not a task to be finished with mere official routine work. It is necessary to see that something new is being born here, something which demands not

just any aid, but the enthusiastic aid of every expert working in this field. Provision for measurement technology and instruments for it, adequate for this industry is waiting for the reader, sometimes by means of research and development on embargoed instruments. The task is not an easy one, but it can be accomplished, and for this I ask the individual support of everyone of you and of the organized social assistance of the scientific associations. Let me now express my thanks to you in advance.

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BRIEFS

INTERFERON RESEARCH--Plans for producing Interferon for experimental, research purposes were revealed at a press briefing recently held at the Ministry of Health. Newsmen were told that the United Pharmaceutical and Nutriment Factory in cooperation with Hungarian institutes will establish conditions for producing unrefined Interferon. After the necessary inspections have been made, institutes conducting research and testing will be supplied with the necessary material in a year or two. According to the briefing, Interferon has been tested on virus infections such as herpes and rabies with disappointing results. There has been no true breakthrough in the case of cancer although results abroad indicate that certain tumors can be cured provided that they are in the beginning stages. Like all biologically active substances, Interferon has harmful side effects: it causes fever and loss of hair. Although research will continue in Hungary, Interferon will not be marketed in the near future, especially not as a wonder drug. [Budapest NEPSZABADSAG in Hungarian 15 Nov 80 p 5]

BEARING WORKS COMPUTER--A modern high-capacity ES 1030 computer has been put into operation at the Hungarian Roller Bearing Works of Debrecen. The system is part of a reconstruction which was completed at the end of last year. In the past the works farmed out the calculations it needed to make on a commission basis. Such work will now be done on the ES 1030. Initially, the computer will work a single shift but plans call for it to do work commissioned by various factories in the Hajdusag Region. If necessary, the computer will be operated in three shifts. [Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 1]

MECHANICAL SPEECH RESEARCH--Similarly to technically developed countries, efforts are being made in Hungary to find "computer solutions" to the problem of "talking machines." The research involved is being conducted at the laboratory of phonetics of the Institute of Linguistics of the Hungarian Academy of Sciences. The work is under the direction of Dr Kalman Bolla, candidate. Further information on this work will be published in a subsequent article. [Budapest SZAMITASTECHNIKA in Hungarian Oct 80 p 5]

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PROSPECTS FOR INCREASING GEOLOGICAL EXPLORATION DISCUSSED

Bucharest FLACARA in Romanian 2 Oct 80 p 5

[Interview with Dr Iosif Bercea, place and date unknown, by Cici Iordache: "Let Us Fully Trust Our Geologists"]

[Text] Dr Iosif Bercea was born in 1931. He attended high school in Tecuci and enrolled in the University of Bucharest where he graduated from the Geology Department in 1953. He first worked as a geologist in prospecting, and, later, in 1960 as a scientific researcher at a specialized institute. He received his doctorate in 1972 with a thesis that was awarded a national scientific award on the subject "Metamorphides in the Godeanu Mountains." He has published, together with other authors, numerous works regarding the geology of the Western Carpathians and the geological and mineralogical nature of the ultrabasic and basic rocks of the Southern Banat. He has created a veritable school in the field of tectonics using the methodology of structural analysis. In 1974, he assumed the position of director of the Institute of Geology and Geophysics, while also currently being the director general of the Central Institute of Research for the Mining Industry. He is a deputy of the Grand National Assembly and Romania's representative to CEMA's Convention for Research of the Seas and Oceans for the purpose of putting their minerals to use -- INTERMORGEO. He has been awarded the Order of "Scientific Merit," second class.

[Question] We meet again after how many years, comrade director?

[Answer] I think it has been 9 years. I can tell you exactly, it was 1971. I remember because of my son Andrei's age.

[Question] I had gone to Rusea, several kilometers from Vatra Dornei and deep in the heart of the mountains, to write about a family of geological researchers. There was a heavy rain that day and I found you at home, at a very hospitable guest house in the village. Your son Andrei, who was not even 2 years old, was crying because he wanted to go outside, and his mother, Elvira Bercea, who is also a geologist, was cooking a peasant dish and carrying on a professional discussion with... her husband. What were you studying back then?

[Answer] There were three families in the area, spread out over several locations. We were responding to a very important social demand for our country looking for raw materials. We were studying an area of interest for useful substances, specifically for polimetallic sulphides and manganese, as well as deciphering a knot in the geological structure of the Eastern Carpathians that had profound implications for the geological picture and overall orientation of prospecting and exploration activities and for calculating the reserves of the mining industry. At that moment, we were involved in certain important discoveries: the existence of a connection between the region of Fundul Moldoviei and Lesu Ursului and the region north of Balan. We were getting solid information about the location of ore deposits, a very important thing.

[Question] And, it is very difficult to obtain such information?

[Answer] Very difficult. You have to make order out of a mixture of rocks and make new, detailed arguments against an existing geological picture. Deciphering the detailed structure and the stratigraphy of the crystaline schists in the Eastern Carpathians, leading to precisely identifying the location of accumulations of polimetallic sulphides, was a research project of considerable proportions and an essential contribution to the continuation of extraction projects. I repeat, and I want you to remember this, that it was not the Bercea geologists alone that did this, but a grouped made up of six researchers who, by circumstances, were three couples. The other two couples were the Muresans and the Krautners.

[Question] Since at the time you told us quite a bit about Godeanu and the mountains that are the subject of you thesis, how much time have you spent working in the Eastern Carpathians?

[Answer] I would say that I have practically continuously worked in the Eastern Carpathians from 1960 to 1973. Over a stretch between Prislop Pass and Brosteni. The geology of the Godeanu Mountains has fascinated me. It was, as we say, a "pink spot," an area that was not only very isolated geographically, but also sufficiently unknown from a geological point of view. During the span of five campaigns into the area, I brought this area to a modern level of understanding and obtained an advanced amount of scientific information. I uncovered a completely unusual fact, one that was unknown and unsuspected until that time in our country - certain fissures under different pressures within the framework of the same region, a geologic phenomenon encountered normally in Japan, the Pyrennees and North America.

[Question] What importance does this have in a practical sense, for society, the discovery of such an aspect of geological time, such a curosity of nature?

[Answer] A very great importance in deciphering the evolution of rocks and the formations and useful mineral substances. On a scientific level, for the first time we see in the Carpathians, and not just in the Carpathians, but in the Carpatho-Balkan region, the existence of this type of association of minerals.

[Question] In addition to the Eastern Carpathians and the fantastic and unexpected Godeanu Mountains, in what other areas have you been? And, with what results?

[Answer] I was part of a group of researchers that explored the southern Banat region. In presenting the geological and mineralogical nature of the ultrabasic and basic rocks, the research also produced a series of scientific works. The studies made an effective and especially significant contribution to providing the raw materials for producing magnesium. Large reserves of serpentinites were found which contained mineral substances especially necessary to the national economy. Currently, ICECHIM is carrying out research for its complex use, with the later extraction of subproducts and other useful elements, such as nickel, chromium, palladium. In recent years, geological knowledge in our country has experienced broad progress and for some regions, such as the Apuseni Mountains, the Eastern Carpathians and the Banat, there has been a veritable revolution in their detailed analysis. Investigations using ever more complex, precise and modern devices, including satellite surveys, are completing and changing nearly daily the geological picture of the overall and detailed make-up of our country. Currently, we have a level of geological knowledge of our country that is much more advanced compared to other countries in the world. First of all, this is because of the state allocated funds for this scientific sector of activity and the national programs initiated by our party's leadership at the 11th and 12th Party Congresses regarding the development of our own base of raw materials and the higher use of existing minerals still underground in our country. Second, it is because of the research activities in drilling for hydrocarbons, with Romania being one of the pioneers in this field in the entire world. This drilling has provided an impressive amount of information on the diverse underground strata. The maps that our institute draws up and publishes are based upon the virtually exhaustive information stemming from both our own research and the interpretation of the data furnished by the overall geological effort -- prospecting, exploration and extraction. As we say, we are continuously bringing up to date the picture of Romania. For scientific reasons and for social purposes, this was also the reasoning behind the 1974 unification of the two institutes -- of geology and geophysics. Both fields of research had reached a certain level of cooperation corresponding to the overlapping of data needed to draw certain conclusions with regards to the geological structure of the country and the structure of ore deposits. In this way, we have been able, and are able, to offer those involved in prospecting and exploration a truly scientific basis to more precisely and exactly determine the areas of interest and analysis for useful substances.

[Question] Actually, comrade director, this is the purpose of our visit here today: to find out what is the contribution of research in providing a base of raw materials from domestic resources. At the recent Congress of People's Councils, comrade Nicolae Ceausescu stressed, among the priority objectives, the need to intensify research and use the existing reserves of useful mineral substances throughout the country, including low-grade ores or those more difficult to exploit. How are you responding to this national requirement?

[Answer] Everyone knows the mining projects that have come into operation in recent years! Our research is "behind" these projects. For example, the discovery of the ore deposit at Palazu Mare in Dobrudja is the result of magnetometric research that led to identifying this large accumulation of iron ore, later confirmed by drilling. For the first time, geophysicists were able to uncover it.

In recent years, great progress has been achieved in furthering the knowledge of the potential for useful substances in the metallic ore-bearing mountains in the southern Apuseni, both for complex minerals and precious metals. Here, the cooperation in prospecting and exploration went right through to the production phase, with valuable contributions to increasing the amount of exploiatable reserves. The credit here goes to geologic researchers Mircea Borcos, Ion Berbeleac and Haralambie Savu. The institute directly and effectively participated in drawing up numerous research, prospecting and exploration projects for the principal deposits scheduled to be exploited in the coming five year plan.

[Question] Can you be specific?

[Answer] The entire theme contained in the institute's plan is strictly centered around the objectives of the Directives of the 12th Congress and the Scientific Research Program. As is normal, we have the 1981 plan ready and it is as specific as possible. One of the major themes refers to establishing the areas of interest for primary energy sources - coal, combustible shale and geothermal waters. For the coal and shale we will carry out research in the Eastern Carpathians - Vaii Humorului region; in the Southern Carpathians - Sirinia-Resita region; and, in the Lugoj (Sinersig) Basin, as well as in the Getic Depression, in other words, along the entire Romana Plains (Motru-Cosustea; western Oltenia), and in Transylvania in the Tihau-Cristoltel sector. We are opening up complex research, in geology, geophysics, geothermometrics and teledetection, in the Pannonian Depression (the Western Plains), in the Moesic Plateau and in northern Moldavia, as well as geothermal research regarding the possibilities of using the energy potential of dry heated rocks in the Calimani-Gurghiu-Harghita volcanic chain.

[Question] Fascinating! And, how will you get, how will you bring the heat of these rocks up from the depths, from "the fire in the middle of the earth?"

[Answer] The technical experts will give us the word when the time comes. Right now, the answer is injecting water from the surface. In the experiments that will take place at Calimani, in which we will take part, we will keep track of the temperature of the water that comes back to the surface, the water that has been heated, in order to substantiate the economic chances of using this source of energy. In Japan, it is already being used and we are optimistic that we will succeed also.

[Question] What about thermal waters, which are sufficiently abundant in our country? What energy chances are there? Do you believe in this new source of energy?

[Answer] A great belief! As I have pointed out above, we have scheduled research in this area. We are continuing to study the behavior of the geo-thermal source being exploited at Sacuieni for the purpose of optimizing its use.

Another big chapter in our 1981 plan refers to establishing future areas of interest for useful metal-bearing mineral substances, including low-grade ores. For iron and manganese we have planned research projects using an unusual method of analysis. In the Eastern Carpathians, it will be in the area of Vatra Dornei - Iacobeni; in the region of the headwaters of the Dimbovita River; in the Banat and in Dobrudja (Cirjelari-Altin-Tepe, Baspunar). We are talking about a detailed research at various depths that is based upon earlier studies of the geological structures in the areas I mentioned.

[Question] What about in the field on non-metallic ores? These veritable new "El Dorados" of the modern era, when industries are ever more complex and more sophisticated, and are more involved with chemicals?

[Answer] They have a very great future in our country. And so they must! Some developed countries have already begun to include the level of use of non-metallic substances among the indicators of the degree of civilization. We also have a program in this field regarding the determination of reserves and mineralogical research for these substances. There are studies on bauxite in the Padurea Craiului Mountains, on betonite in Maramures, on salts in the Sub-Carpathians in Moldavia and on sands and quartzite stone in northern Moldavia.

[Question] Comrade director, the Scientific Research Program for the future calls for, as we know, the geological understanding of the floor of the Black Sea and the study of the continental shelf from a mineralogical point of view, as well as participation in research on the world's oceans. What are doing in this regard?

[Answer] Everything that you have mentioned. We are continuing to look for solid minerals in the continental shelf of the Black Sea in the area of Sfintul Gheorghe - Portita. By using a modern geological and geophysical device we will determine the areas of sand containing heavy minerals and, we hope, we will have all the data we need to make a contribution to understanding the configuration of the sea bottom off our coast. At the same time, our researchers will make their contribution to the studies for the placement of off-shore drilling platforms. Beginning next year,

we will intensify the geological and geophysical study of the Danube Delta for its mineral potential, starting projects in the Ceatal-Pardina-Tulcea region, as well as in the area of the bends of the Chilia branch of the Danube and the Rosu-Rosulet Depression. Similarly, we have proposed the geo-dynamic complex study of the Romanian coast, an urgent project, for the purpose of protecting it against sea erosion and, thus, protecting the numerous economic and tourist facilities.

[Question] Is there such a danger?

[Answer] Naturally, yes. The phenomenon exists and, if left alone, can give us a surprise over time. Certainly, however, it will not be left alone.

[Question] What about the world's oceans? When?

[Answer] As in other areas of research where we will be dealing with the latest, newest methodologies and technologies, we need to complete our equipment holdings with working devices and instruments. In this regard, we also have a program and the assistance of the National Council for Science and Technology and our ministry, and, in this context, we hope we will be equipped with everything we will need. In order to explore the world's oceans, we need a specialized research ship. We know that we are beginning to get experience in the field of designing and building research ships.

[Question] Yes, at ICEPRONAV in Galati. We are convinced that the specialists there will be receptive to your requests. The first oceanographic research ship, destined for the Institute of Marine Study in Constanta, a ship of Romanian design and a special accomplishment, is a guarantee that you will have your ship.

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